

Ross Drive Bridge  
Ross Drive spanning Rock Creek 0.6 miles  
south of Joyce Road, NW  
Rock Creek Park  
Washington  
District of Columbia

HAER No. DC-13

HAER  
DC.  
WASH,  
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PHOTOGRAPHS  
WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record  
National Park Service  
Department of the Interior  
Washington, DC 20013-7127

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HISTORIC AMERICAN ENGINEERING RECORD

ROSS DRIVE BRIDGE

HAER NO. DC-13

Location: Ross Drive spanning a tributary of Rock Creek 0.6 miles south of Joyce Road, Rock Creek Park, Washington D.C.

UTM: 18/322910/4313360  
Quad: Washington West

Date of Construction: 1907; widened 1968

Engineer: Maj. Jay J. Morrow, U.S. Army, Engineer Commissioner of D.C., Capt. E. M. Markham, U.S. Army, Assistant Engineer Commissioner

Designer: The office of W.J. Douglas, Engineer of Bridges of the District of Columbia

Builder: W.P. Darwin, Assistant Engineer of Bridges of the District of Columbia

Present Owner: Rock Creek Park  
National Capital Region  
National Park Service  
Department of the Interior

Present Use: Vehicular bridge

Significance: Ross Drive bridge is one of the earliest known triple-hinge bridges in the United States. The bridge is an open spandrel, reinforced concrete bridge with three parallel arches.

Historian: Marcia M. Miller, 1988

After many years of proposals, Rock Creek Park was created by an Act passed by Congress on September 27, 1890. Containing appropriations to purchase 1605.9 acres of land running along Rock Creek from the Maryland border to the Zoological Park to be preserved as a natural park, the act defined the purpose of the park as providing "for the preservation from injury or spoliation of all timber, animals, or curiosities within said park, and their retention in their natural condition as nearly as possible."<sup>1</sup> At the time, the United States government had designated only two other such areas as natural parks.<sup>2</sup> The Commissioners of the District of Columbia and Chief of Engineers of the United States Army jointly controlled the park (although at this time the military exercised more authority). Their duty was to lay out paths and roads for public use. After purchasing the land, however, Congress did not provide for any improvements to the park for the next seven years.

Since Congress did not appropriate money for work within the park, chain gangs (comprised of District prisoners) completed the improvements to paths and roads. In 1898, Congress finally approved funding to create a road running the length of the park. Beach Drive followed the natural course of the path along the creek.<sup>3</sup> This became, and remains today, the main thoroughfare through the park.

As the park grew more popular, the Board of Control of Rock Creek Park planned new, more accessible routes throughout the park. Ross Drive was laid out circa 1902, connecting old Military Road and Ridge Road (renamed Glover Road in 1902) in the lower section of the park.<sup>4</sup> As early as 1903, a wooden trestle was built across the deep ravine along Ross Drive. By 1907, the engineer commissioners decided to replace the bridge with a more permanent structure.

As with all early twentieth century bridges built in Rock Creek Park, the new Ross Drive bridge was designed with setting and location in mind. "The vistas afforded from these roads required as light a structure as possible so as not to obstruct the view and the picturesque nature of the site

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<sup>1</sup>Mackintosh, Barry. Rock Creek Park An Administrative History. History Division, National Park Service, Department of the Interior, Washington, D.C., 1985, p. 17.

<sup>2</sup>ibid. Yellowstone and Sequoia National Parks were the first two parks to be designated as such.

<sup>3</sup>Beach Drive is named in honor of Col. Lansing H. Beach, Army Corps of Engineers, U.S. Army, who served as Secretary of the Board of Control of Rock Creek Park and later as the Bridge Commissioner for the District of Columbia. He is responsible for the early improvements to Rock Creek Park.

<sup>4</sup>Ross Drive was named in honor of Com. Ross, President of the Board of Commissioners of Washington, D.C. until his death in 1902.

suggested some treatment which would not obtrude but would blend well with the landscape."<sup>5</sup> To follow this, the designer specified two items for the bridge (1) to build a ribbed arch with light spandrel columns and (2) to make no attempt at finishing the concrete but to have troughs throughout each spandrel from which vines would hang to create a natural appearance.<sup>6</sup> Except for the vines, the bridge would be functional with no additional ornamentation. In keeping with the lightness effect, it was decided to use a three hinged arch which would make the structure determinate. The stresses throughout the entire bridge could thus be calculated to a higher degree of accuracy than if no hinge had been used. Since very accurate estimates of the amount of materials needed for construction could now be obtained, designers thus maximized space and minimized material in order to give the bridge a much lighter appearance. This arch had been successfully used in Europe but was virtually untried in the United States at the date of construction.<sup>7</sup>

The bridge is a three hinged, reinforced concrete, single arch span with open spandrels. The central arch is one hundred feet long, with a fifteen foot rise and a thirty foot approach. There are three parallel arches carrying the spandrel columns at intervals of ten feet.<sup>8</sup> The hinges are pin-connected and expansion joints in the arches are placed in the masonry over both springs but not at the crown. The concrete is reinforced slightly at the arch crowns and completely at the floor slabs and at each column. The abutment foundation is of broken brick concrete. When first built, the bridge was used only for light traffic and thus was only one lane with no sidewalks.

In 1907 the old timber trestle located on this site was used (with slight modifications) as "centering" for the new bridge's arch rib. The flooring of the old bridge was also used as forms for the slabs. The floor system of the new bridge was of squared timber from one of the larger city bridges. The use of the old bridge in construction of the falsework lowered the costs.

The Office of the Engineer, under the direction of W.J. Douglas, Engineer of Bridges of the District of Columbia, designed the bridge. W.P. Darwin, Assistant Engineer of Bridges and W.R. Lapham, Superintendent

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<sup>5</sup>"A Light Three-Hinged Concrete Arch Bridge in Rock Creek Park, Washington, D.C.," Engineering News 21 (May 1908) 555-556.

<sup>6</sup>ibid.

<sup>7</sup>The first triple hinged bridge built in the United States (in 1906) was located at Brookside Park in Cleveland, Ohio [Hackendorn, H.F. "Three-Hinged Concrete Arch Bridge, Brookside, Cleveland, O.," The Engineering News Record v. 55 (10 May 1906) 507-508]. The Ross Drive bridge is reputed to be the second constructed in the United States.

<sup>8</sup>The engineering descriptions were taken from Engineering News, May 21, 1908, pp. 555-556.

completed the construction under the supervision of Major Jay J. Morrow, U.S. Army, Engineer Commissioner, and his assistant Captain E.M. Markham.<sup>9</sup>

Because of the bridge's distant location from the developed part of turn of the century Washington, the costs of labor and materials were abnormally high. Laborers were paid twenty-five cents extra per day, and the price of the materials was slightly higher due to the need to haul them from the city. From the beginning, the budget was a major concern of the engineers (which is another reason the triple hinge design was selected). The final expenditures for the bridge amounted to \$4,754 with the material costing \$2,100.<sup>10</sup>

In 1968, the bridge was widened to two lanes with the extra roadway cantilevering out approximately thirty inches from each side. Also at this time, a coat of gunnite was applied to the badly spalled concrete. No early documentation shows that the vines were actually planted either in the troughs or alongside the approaches.

Major rehabilitation of this bridge started in November, 1988 and is scheduled to be completed in May, 1989. It involves removal of a considerable portion of the gunnite which is poorly adhered due to deteriorated underlying concrete. The deteriorated concrete will also be removed down to a sound surface and exposed reinforcement steel cleaned before applying a new coat of gunnite. The steel hinges and railings will be cleaned and painted.<sup>11</sup>

The Ross Drive Bridge is an excellent example of a structure with "no pretense of ornamentation" that blends with its surroundings as well as any aesthetically planned bridge. It is "significant for its early engineering distinction of being an open-spandrel concrete arch with no...ornamentation other than its organic structural shape...."<sup>12</sup> It has been favorably compared to the bridges in Europe, especially those designed by Maillart twenty years later.<sup>13</sup> At a time when the bridges in Rock Creek were mainly reinforced concrete with stone or rubble facing, Ross Drive Bridge is unique in its simplicity. The long, open spandrels complement the deep ravine and add to the quality of the setting. This bridge, along with the nearby Boulder Bridge (see HAER No. DC-12), was listed in the National Register of Historic Places in 1979.

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<sup>9</sup>"A Light Three-Hinged Concrete Arch Bridge in Rock Creek Park, Washington, D.C.," Engineering News 21 (May 1908) 556.

<sup>10</sup>ibid.

<sup>11</sup>E. Macdougall Palmer, Rock Creek Park, National Park Service.

<sup>12</sup>Myer, Donald Beekman. Bridges and the City of Washington. U.S. Commission of Fine Arts, Washington, D.C., 1974, p. 78.

<sup>13</sup>Maillert designed numerous bridges in Europe known for their light appearance.

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ADDENDUM TO  
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